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Uniformly Accelerated Detector in (3+1)D Spacetime: From Vacuum
Fluctuations to Radiation Flux

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Abstract

We analyze the interaction of a uniformly accelerated detector with a quantum field in (3+1)D spacetime and derive the two-point correlation functions of the detector and of the field separately with full account of their interplay. We find that there does exist a positive radiated flux of quantum nature emitted by the detector in steady state, with a hint of certain features of the Unruh effect. We further verify that only some part of the radiation is conserved with the total energy of the dressed detector. Since this part of the radiation ceases in steady state, the hint of the Unruh effect in late-time radiated flux is actually not directly from the energy flux that the detector experiences in Unruh effect.